

THE ATOM

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December, 1967

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THE ATOM

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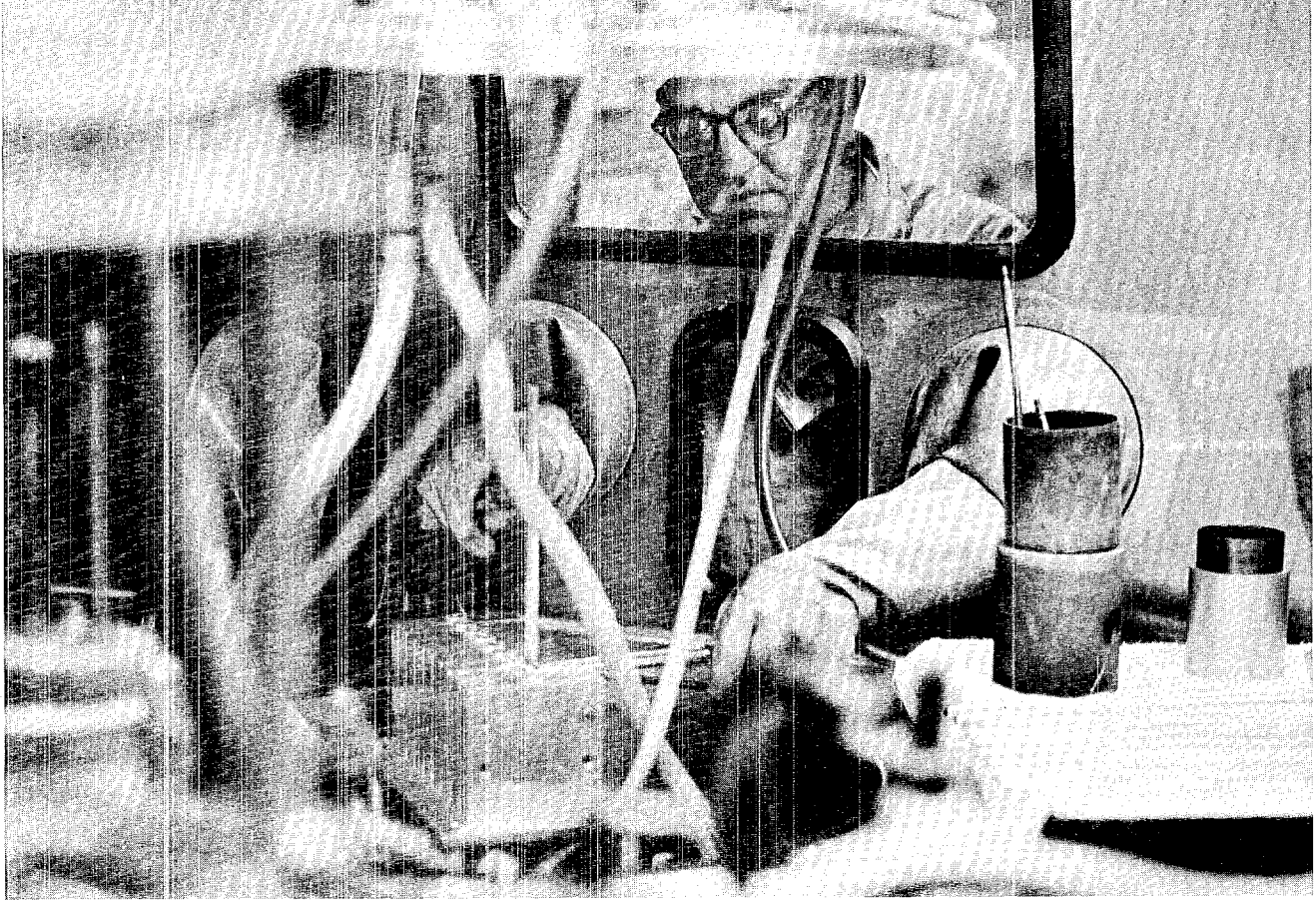
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COVER:

Nature trimmed The Atom's cover
Christmas tree, and Pub's Bill
Regan photographed it. Merry
Christmas!



Joseph W. Romero of the metal fabrication section removes a rod of plutonium from a mold. This is one of the

many shapes cast from electrorefined plutonium for metallurgical studies at LASL and at other AEC laboratories.

Plutonium Research: Historical Role of DP-West

ALMOST ALL TRAFFIC into or out of Los Alamos is by way of East Road, which leads into town past the airport, and for visitors using this route their first glimpse of the Los Alamos Scientific Laboratory is likely to be the large assortment of buildings, exhaust stacks and storage tanks visible to the south across a small canyon.

This assortment includes the DP-West Site, a fitting introduction to LASL, not only because it dates from the Laboratory's Manhattan Project days, but also because most of the work done at DP-West deals with a substance close to the heart of LASL research and development programs, both past and present.

This substance is plutonium—the reactor-produced element so important to so many areas of nuclear science and industry. Plutonium (Pu) exists in the form of several isotopes. The most common—and the one usually referred to as just “plutonium”—is Pu-239, but other isotopes, including Pu-238, Pu-240 and Pu-241, also have been made. In fact, more is known

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Walter Mohr, left, Eldon Christensen and Temple Chronister, work at the glove box line in the plutonium recovery section in which plutonium scrap and residues are prepared for the metal production process.

Plutonium Research . . .

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of the chemistry and metallurgy of plutonium, an element unknown to man until 1941, than of many common metals known and used for centuries.

DP-West Site was built in 1945 for processing plutonium and producing bomb cores. DP-East was built at the same time for the processing of polonium. The original plutonium production work at Los Alamos was carried out in the Chemistry Building (D Building), one of the wooden structures in the original technical area around Ashley Pond.

By 1945, however, the increasing volume of plutonium material from the Hanford reactors, the growing awareness of the plutonium health hazard and the dangers of a fire in D Building had combined to make the new facilities, incorporating the latest in fire and radiation control and protection, necessary.

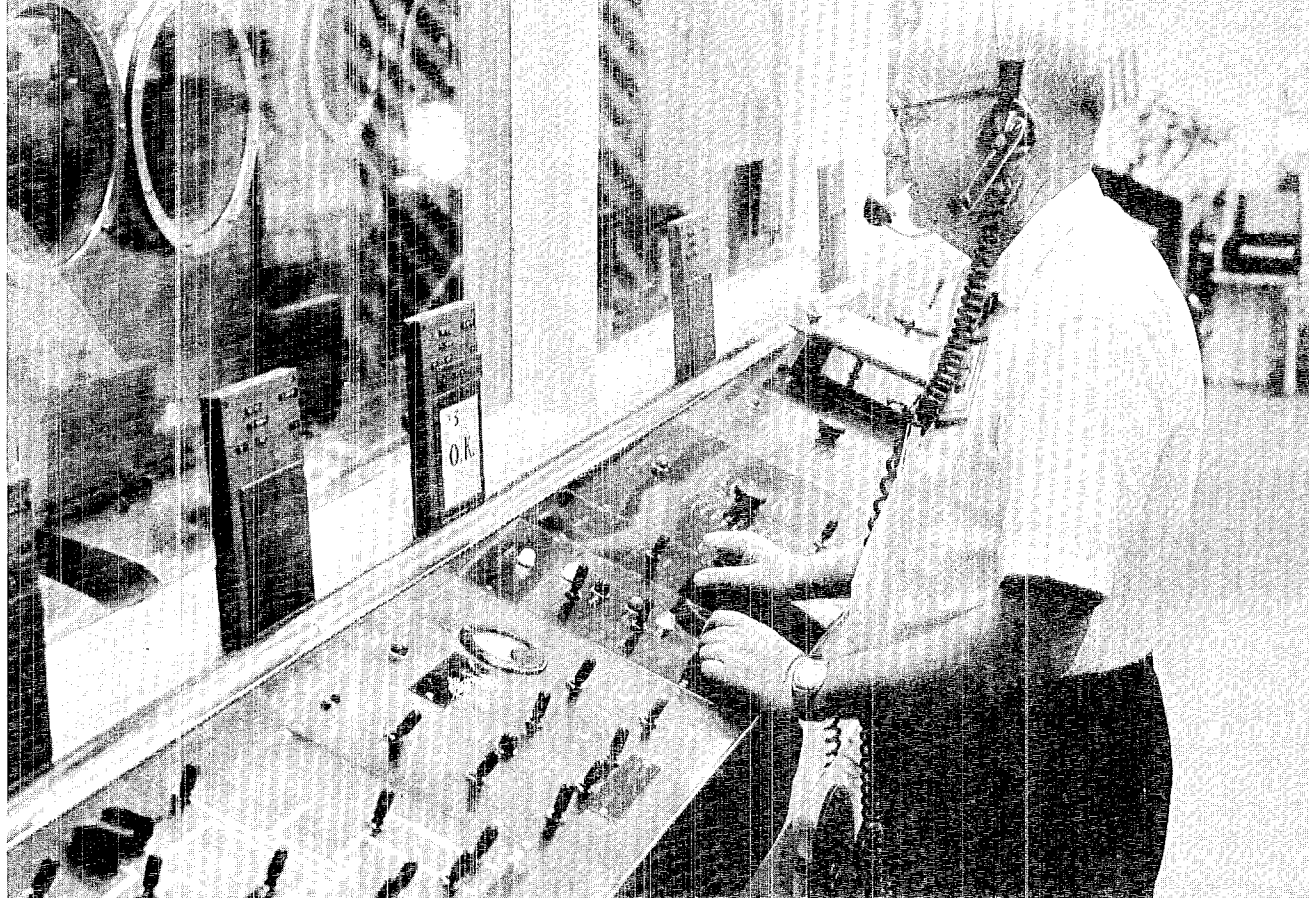
These same facilities, considerably modified and enlarged, are still being used for the purification and study of plutonium. Much of the work is done by CMB-11, the direct descendant of the group responsible for plutonium metal production and fabrication in 1944 and 1945.

Since then the group's activities have expanded so that in addition to plutonium metal recovery, production and fabrication, the group is involved in a broad program of basic research and development on the physical and chemical properties of plutonium and its compounds.

At present, CMB-11, headed by Group Leader William J. Maraman, is made up of more than 50 people assigned to five sections—metal production, plutonium recovery, metal fabrication, research and development and engineering.

The production and fabrication of plutonium metal, the functions for which DP-West was built, are still an important part of CMB-11's work. This is carried out in four interconnected buildings constructed in 1945. This facility was the first in the country designed specifically for the preparation and fabrication of plutonium metal.

The original metal production process has been greatly modified and improved since 1945. A remotely-controlled metal production line, designed and built here in 1951, is used by the metal production section to produce plutonium metal for use at LASL. This production line, the first ever built at an AEC-supported laboratory, served as a model for later installations at other laboratories. Here a plutonium nitrate solution, which is produced by the plutonium recovery section from a wide variety of plutonium scrap and residues generated by experimental programs at DP-West and other sites, is processed.



Cecil Stevens operates control panel of the metal production facility in which plutonium nitrate solution is converted into plutonium metal.

The recovery of plutonium from this "waste" material is a simple matter of economics. The value of this element depends on many factors, including its isotopic composition, but it is at least 10 times the value of gold.

In the metal production line, plutonium peroxide is precipitated from the nitrate solution. The peroxide is then converted into plutonium tetrafluoride which, in turn, is mixed with calcium metal and heated in a special container called a metallurgical "bomb." The highly-reactive calcium combines with the fluorine in the plutonium tetrafluoride, leaving molten metallic plutonium which forms a 360-gram disc or button in the bottom of the "bomb." After cooling, the plutonium button is sent on to the metal fabrication section.

This section operates a foundry and machine shop devoted exclusively to casting and machining plutonium and its alloys. These facilities are used to prepare a wide variety of plutonium parts for many basic research programs at the Laboratory.

One service consists of the preparation and encapsulation of foils of uranium-233, neptunium-237, americium-241 and assorted plutonium isotopes for

use as neutron detectors. These foils are used by health physicists and physics researchers in dosimetry studies to measure the number or energy distribution of neutrons. The foils are welded or soldered into nickel, stainless steel or copper capsules. Some compounds, mostly oxides, are also used as foils.

Plutonium is a very toxic material and therefore cannot be handled directly. This does not mean it is necessarily dangerous to work with plutonium, but it does mean that particular precautions, special equipment and strict adherence to safety rules are in order.

In CMB-II's facilities, all processing and handling of plutonium or plutonium compounds is done in specially designed hoods and glove boxes. To further insure against leakage of plutonium, the enclosures are maintained at a slight negative pressure with respect to the room so that air movement will be from the room into the hoods rather than out of the hoods. All air potentially exposed to plutonium is passed through a bank of filters to remove any contamination and finally is exhausted through a series of 50-foot stacks. Since plutonium is pyrophoric (burns

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Joseph A. Mascarenas of the plutonium recovery section logs the contents of the set of storage tanks for plutonium solutions.

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spontaneously in air when in the powder state), glove boxes in which it is machined must be ventilated with an inert gas such as argon.

Plutonium metal has the property that when heated from room temperatures to its melting point of 640° C, it goes through six different crystal structures (phases), each with a different density. For example, there is a nine per cent increase in volume in the change from the alpha phase to the beta phase, which takes place at 117° C. Personnel in the metal fabrication section are studying the fluidity and castability of plutonium and the preparation of crack-free, high-density, high-purity metal. Samples with densities of 19.80 grams per cubic centimeter (the highest ever achieved) have been produced. This is only 0.05 gm/cc less than the theoretical value of 19.85 gm/cc.

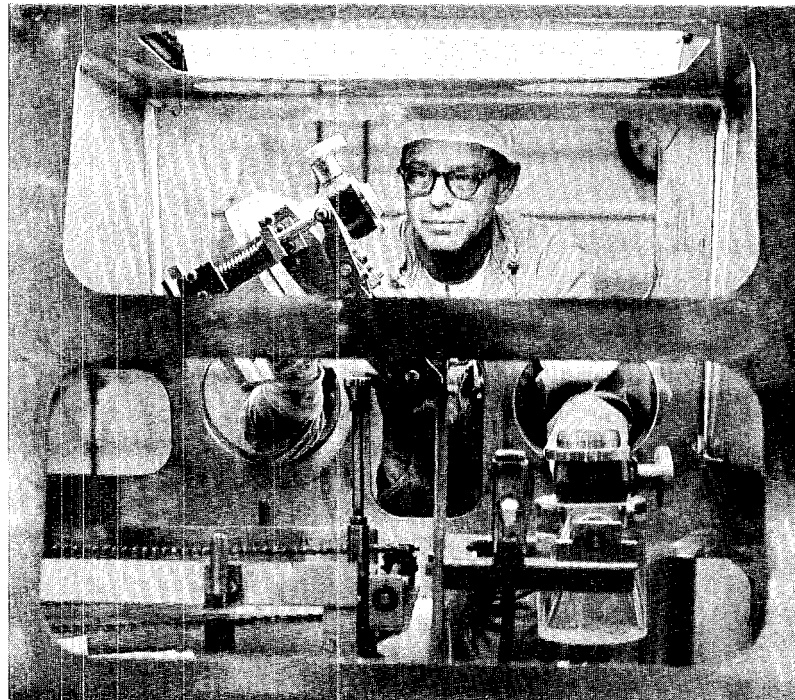
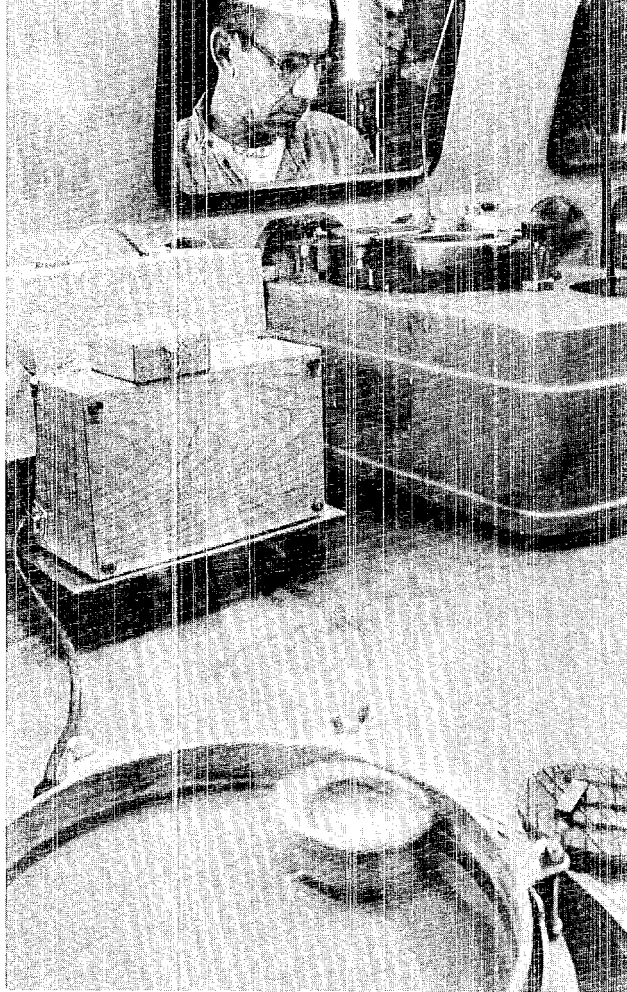
Before 1956, CMB-11 had been involved in a modest research effort in direct support of the group's plutonium recovery and metal production operations. In 1956, CMB-11 entered into the field of research

and development in earnest as a result of the Los Alamos Molten Plutonium Reactor Experiment (LAMPRE). Because of the LAMPRE project there was great interest in pyrometallurgical reprocessing—that is, the reprocessing of reactor fuel at high temperature to remove fission products and recover unused plutonium.

Since at that time the exact plutonium alloy to be used in LAMPRE was not defined, the group began a general program of research on the high-temperature chemistry and metallurgy of plutonium. This experimental work was begun by Joseph A. Leary under the direction of Group Leader Richard D. Baker. Baker now heads CMB division, and Leary supervises the work of the CMB-11 research and development section as alternate group leader.

The original process development involved plutonium-iron, plutonium-cobalt and plutonium-cerium-cobalt alloys. Studies were made of the basic chemistry and thermodynamic properties of plutonium materials.

Then, in 1959, high-temperature research was be-



LEFT: Joseph Nichols checks the operation of a lapping machine used in the metal fabrication section to polish plutonium samples to a mirror finish. ABOVE: Charles Arnold inspects equipment in a plutonium-238 metal production glove box line currently under construction.

gun on ceramic and cermet (alloys of ceramic materials and metals) plutonium materials in an effort to diversify the Laboratory's fuel programs. Since 1960, the research and development in this area has been the most rapidly expanding effort of the group and now amounts to about a third of the total. The purpose of this work, most of which is carried out in the \$600,000 Pu fuels building completed at DP-West in 1962, is not to develop actual fuel but to provide the basic information necessary for fuel development.

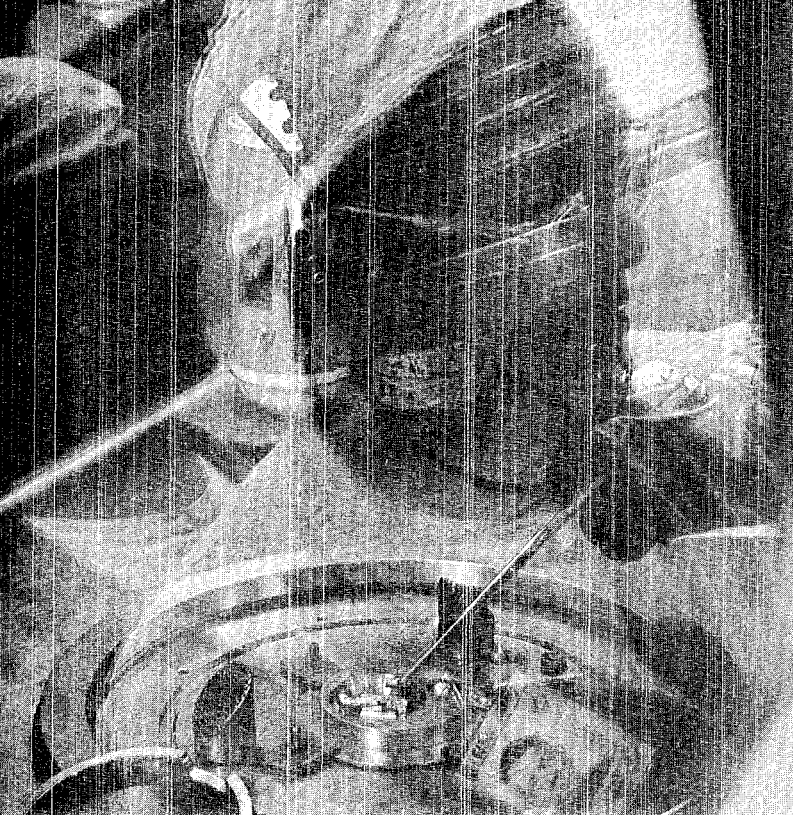
This work has received increasing emphasis because of the possible applications of plutonium ceramic or cermet fuel materials to large power reactors. Plutonium is important to the booming nuclear reactor power industry because it is the key to what promises to be the next great breakthrough in reactors—the breeder reactor that produces more nuclear fuel than it consumes. Essentially all the plutonium used in weapons, in power sources and for research is produced in nuclear reactors fueled with natural uranium made up of 99.3 per cent non-fis-

sionable U-238 and 0.7 per cent fissionable U-235. However, during the operation of the reactor, some of the U-238 atoms capture a neutron to become U-239 which decays quickly into fissionable Pu-239.

Under the proper conditions it would be possible for a uranium-fueled reactor to “breed” more Pu-239 fuel than the equivalent amount of U-235 burned up. The breeder reactor program depends, however, upon finding a suitable form in which to use the Pu-239 in a power reactor. Because of the large expansions and contractions in plutonium metal when it is heated or cooled (due to those phase changes) plutonium cannot be used as a fuel in its pure metallic state. Therefore, alloys or compounds of plutonium must be used.

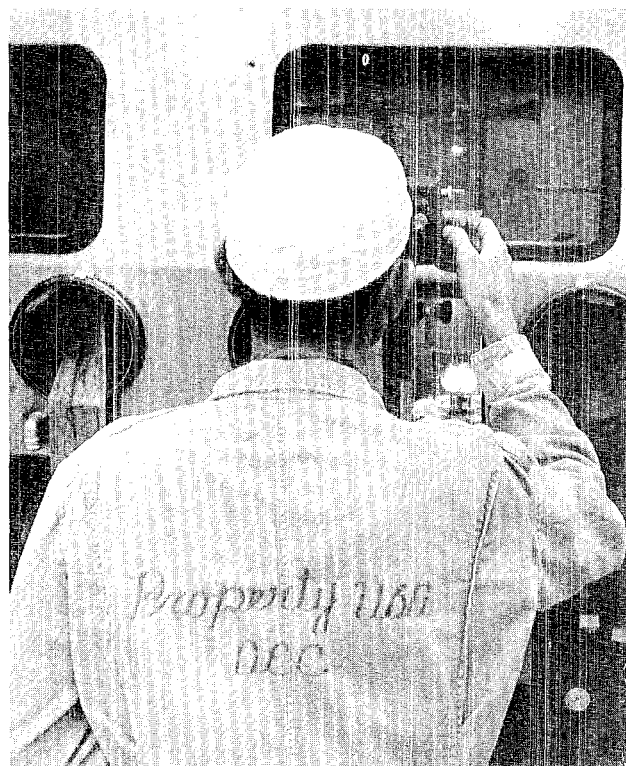
The principal goals of the ceramic fuels program are to prepare pure, well characterized plutonium fuel materials and to determine their high temperature properties. Properties of interest include thermal stability; thermal expansion; thermal conductivity; phase relationships by differential thermal

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A piece of plutonium metal is placed in the hearth of an electric arc furnace along with pieces of uranium-235 and carbon. A 350-amp arc produces temperatures greater than 2500° C and converts the metal to a plutonium-uranium carbide for use in the research and development section's studies of ceramic and cermet nuclear fuel materials. Reflected in the glove box window are the operator, Charles Emery, right, and Mel Shupe.

In one of the research and development section's labs Jim Reavis checks the operation of an induction furnace used to heat a sample of plutonium ceramic material to temperatures as high as 2400° C to measure its melting point and crystallographic transition temperatures.



Plutonium Research . . .

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analysis; structure and phase relationships by x-ray diffraction, high temperature x-ray diffraction, neutron diffraction and high-temperature neutron diffraction; density; hardness and its temperature dependence; compatibility, including electron microprobe analysis; and compressive creep (deformation).

In addition to phase equilibria and general properties, specific thermodynamic properties—such as free energy of formation by vaporization equilibria in the 1000-2000° C temperature range with mass spectrometer identification of vapor species, free energy of formation by electromotive force measurement in the 450-1200° C temperature range and heat capacity and heat of transition—are being determined.

In addition, a joint project with CMB-1 and CMB-14 involves the examination of irradiated fast reactor fuels, such as fuel capsules from the Experimental Breeder Reactor II at the National Reactor Testing Site in Idaho. One of the responsibilities is measuring the properties of the fuel material before it is irradiated. The equipment design and technology developed in CMB-11 for the pre-irradiation examination of plutonium fuel material are currently being adapted by CMB-14 personnel to post-irradiation

Robert W. Walker of the research and development section removes a pellet of plutonium carbide from the die in which it was pressed from a powder. The press can exert a force of 30 tons per square inch.



examination in hot cells. The measurement and assessment of irradiated Pu fuel is of fundamental importance to the fast breeder reactor program and is intimately related to the research program on unirradiated fuels being carried out in CMB-11.

The early work with molten plutonium led to one of the research and development section's most significant achievements—the development of an electrorefining process for producing very pure plutonium metal. The electrorefining plant can produce 40 kilograms per month, in 3.5 kg batches, of plutonium metal containing less than 100 parts per million by weight of metallic impurities.

The electrorefining process has also been used to produce very special materials. By running material through the process more than once, metal of even greater purity can be produced. In a joint CMB-11/CMB-1 effort, this technique has been used to produce two batches of ultra-pure plutonium metal for the National Bureau of Standards (NBS). This material is being used as the primary chemical standard, and samples are supplied by NBS to any laboratory requiring a plutonium standard for checking its work.

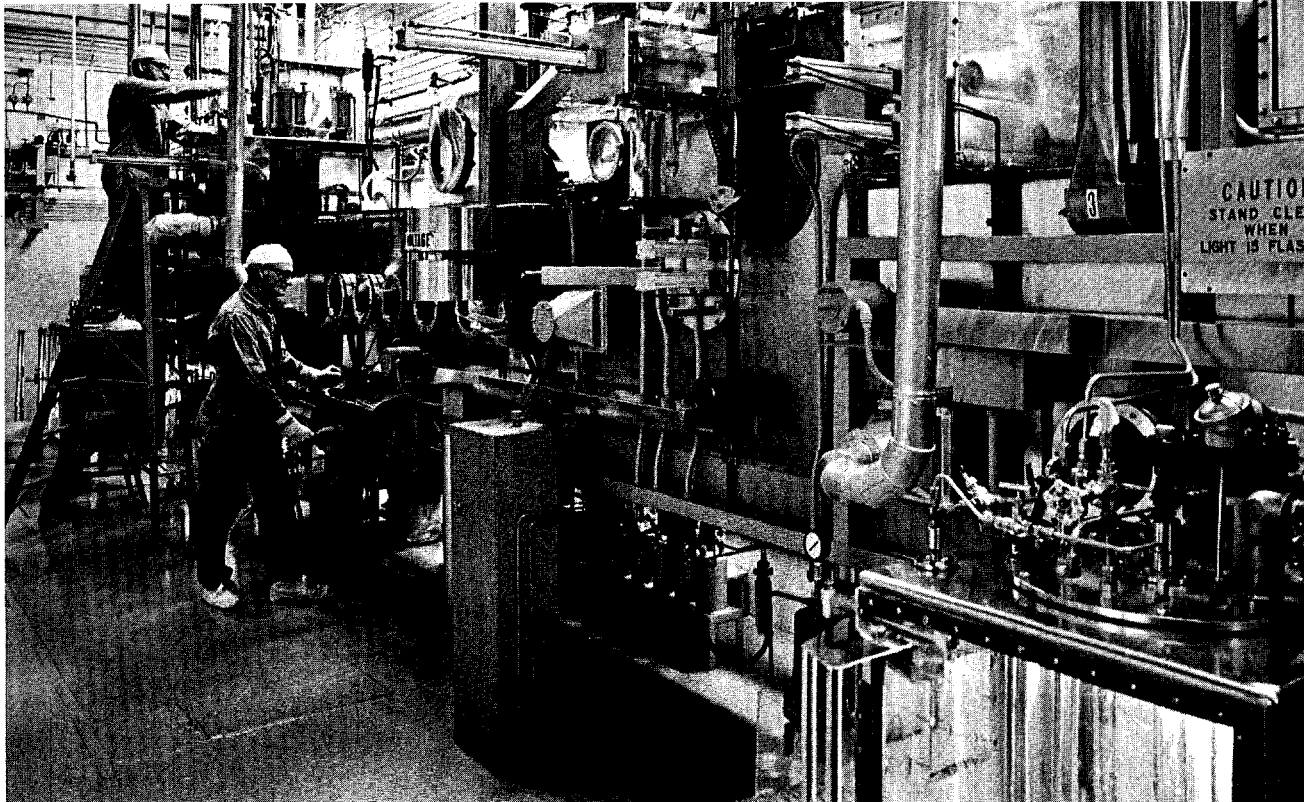
Another application of this technique is to produce ultra-pure Pu-238, a relatively rare isotope val-

uable for biomedical applications. One proposal is to develop an artificial heart in which Pu-238's high heat output of 0.5 watts per gram, as compared to the more common Pu-239's output of only 0.002 watts per gram, would be used to produce steam for a small turbine-driven pump which would assist or replace functions of a diseased or damaged heart.

Four other AEC contractors are conducting design studies for this type of engine, which would use the steam produced in a closed loop by a tiny boiler heated by radioactive isotope such as Pu-238. The entire pump-turbine-boiler assembly would be surgically placed inside the abdominal area of the body.

One of the main problems with this type of artificial heart is finding a radioactive isotope which will produce sufficient heat without exposing the patient to excessive amounts of radiation. The heating is caused by the relatively short-ranged alpha particles emitted by the Pu-238. These alphas are easily contained within the heat source and boiler assembly and therefore would not constitute a hazard to the patient. But penetrating neutrons and gamma rays coming from Pu-238 fission and the decay of impurities such as americium-241 are a hazard. Calculations have indicated that a large reduction in external ra-

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In the metal production section Charles Arnold (on ladder) inserts a crucible into the plutonium metal production line as Carroll Rendell adds calcium and iodine, which are used in the final step of producing metal from plutonium solution.

Plutonium Research . . .

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diation can be accomplished by refining conventional Pu-238, and the CMB-11 R & D section has undertaken a program of electrorefining Pu-238 to produce heat sources with the lowest amount of external radiation possible. These may then be used as the heat source for the steam-powered artificial hearts. The use of plutonium oxide heat sources is also being explored with emphasis on the use of oxygen depleted in the oxygen-18 isotope which has a high cross section (reaction probability) for the alpha-neutron reaction and therefore contributes to the damaging neutron flux from the source.

Pu-238 is also used in one type of SNAP (Systems for Nuclear Auxiliary Power) power supply, which converts heat energy into electrical energy. In 1959, CMB-11 produced the first sample of Pu-238 metal and designed and fabricated the first SNAP power source using Pu-238. SNAP devices have been used to power unmanned weather stations, navigational buoys and satellites. In keeping with a basic LASL policy, the technology developed in CMB-11 for the preparation of Pu-238 metal heat sources was transferred to the AEC's Mound Laboratory, Miamisburg, Ohio, where metal Pu-238 SNAP sources are now routinely prepared. CMB-11 personnel are now working on improved fuel forms.



LASL's 'Girls Friday'

By Marge Orth



Louise Silver is familiar to almost all employees who patronize the South Mesa cafeteria. She serves in a dual role: in addition to handling group secretarial chores for PER-4, she is also assistant food service manager for LASL.

VARIED—this is the one word that could perhaps best describe the secretarial jobs at LASL.

Due to the diversified nature of the Laboratory's work, the connotation "secretary" can mean very different things, depending on whether one is referring to one of LASL's many technical-group offices, a library office, a warehouse office, or a host of other specialized functions performed by the Laboratory in fulfillment of its nuclear research and development mission.

In addition to the standard qualifications of typing, shorthand and clerical aptitude usually found in the "Girl Friday" of an office, very often at LASL she is called upon to exercise her adaptability to unusual

responsibilities and duties. Queried individually, almost all LASL secretaries would undoubtedly agree this makes the Laboratory a fascinating place to work.

All applicants for secretarial and clerical positions at LASL are given a series of aptitude tests before a definite job offer can be made. These tests are conducted by Lorraine Parten, testing supervisor in the Laboratory's Personnel department. They consist of a typing test, a shorthand test (if applicant indicates she writes it); a test in following oral directions, the Wonderlic Personnel Test and a general clerical test. Tests must be LASL-administered, Mrs. Parten explained, so that everyone is measured by the

same "yardstick." According to Marianna Howenstine, employment representative in the Personnel department, the standards for secretaries who are hired have crept up slowly but steadily—in the past several years.

Primarily to assist the new-hire secretary, the Laboratory conducts, as part of its personnel program, a secretarial orientation program, designed to acquaint not only the newly hired, but in some cases, the transferee from one group and job to another, and in still other cases, a secretary who may have been with LASL for some time but wishes to refresh her knowledge.

Although some effort had been

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When LASL hosted an American Physical Society topical conference recently, a group of LASL secretaries pooled efforts to act as registrars. From left are secretaries Faith Stephens, PUB-2; Harriet Sass, P-16; Barbara Ray, P-14; and Betty Pohlmann, P-15. Warren Quinn, associate group leader, P-15, is at left.

Girls Friday . . .

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directed toward orientation of new secretaries as early as 1951, with sessions held in both the old S-Lecture Room and Log Cabin of now-defunct TA-1, it was in August, 1956, that the lectures were first held in the then newly-built Administration Building auditorium. By December of that year, field trips had been added to the orientation.

Mrs. Parten is in charge of the present orientation program, which has expanded to a comprehensive coverage of all service departments, both in lectures and in actual field tours. "We feel it is a well-rounded orientation program—somebody in the group will always be concerned with every aspect, so we think all time is well used," she said.

The sessions are conducted approximately every three months

and are open to all secretarial and clerical workers. Attendance ranges from eight to 15 for each orientation program.

The program as it is now constituted requires four mornings of field trips, plus an all-day lecture session.

The first day's program starts with a visit to the Personnel department, where a member of the personnel staff talks about the functions of the department. Since foreign travel arrangements must be handled somewhat differently than domestic and are supervised by the Personnel department office, a short briefing is given on handling this phase of travel. A film entitled "A Manner of Speaking," on proper use of the telephone, is shown. To complete the first day's session, a tour is taken to the com-



LASL's orientation program for secretaries includes a trip to the Accounting Department's data processing section. Clark Jobes, alternate group leader of AO-4, explains the functions of the group to recent gathering of new hires.

munity relations section of the Public Relations department, where an explanation is given of the responsibilities of the Laboratory in public relations, and, in particular, how tours and visits to the Laboratory are conducted. For those who have not seen it, a tour through the Science Exhibit Hall and Museum is then conducted to acquaint the new hires with the overall programs and accomplishments of the Laboratory.

The second day's tours encompass the Travel Office and problems of handling travel arrangements; the Accounting department, including the data processing section, where computer demonstrations are held; and the Supply and Property department, where a member of the SP staff escorts the secretaries on a trip to the main ware-

house at SM-30, as well as to stationery stock, to salvage and excess property section, the Laboratory laundry and to the carpenters' shop in the shipping and receiving section, where packing and crating are done.

Visits the next day include the Documentary division office, where functions of that division are explained, followed by tours to the illustrations group, D-3, the technical information and editing group, D-6, the Wage and Salary department and Mail and Records.

The fourth, and final, day of field tours is taken up with visits to the Report Library and the Main Library, both part of group D-2; and to both reproduction and photographic sections of group D-8, graphic arts.

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Antonia (Toni) Flores, N-2 group secretary, is one of the many LASL secretaries who are branch librarians. Here she helps a staff member locate a reference in N-2's branch library.



Working in the director's office at LASL provides a never-ending challenge and variety of duties. Ruth Beckett, left, secretary to Assistant Director Jane Hall, checks a point with Jacqueline Czymoure, Director Norris Bradbury's secretary.

Girls Friday . . .

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The all-day session is conducted by a member of the Mail and Records staff, who discusses the preparation and handling of official correspondence and classified documents, as well as special security requirements. This is in addition to a routine security lecture given each new employee at LASL.

Proficiency programs, usually conducted by commercial manufacturers of equipment such as typewriters and copying machines, are held periodically.

In addition to the standardized clerical procedures she has learned, when a secretary reports to her assigned office somewhere within the huge complex that is LASL, she will probably find there are unique facets to her particular job.

For two LASL secretaries, "assigned office" means Nevada. They are Maureen Grogan, secretary to Bert Knight, assistant J division

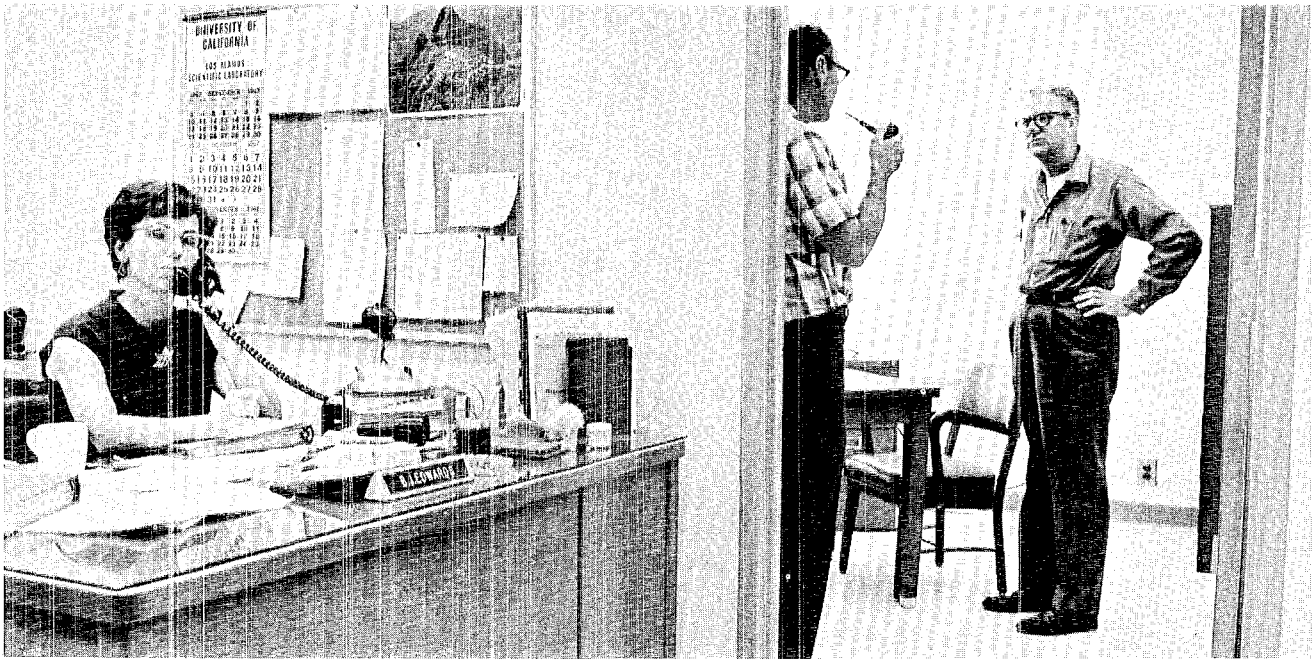
leader at the Nuclear Rocket Development Station at Jackass Flats, and Beverly Cannon, secretary in the airport office of LASL's J-3 in Las Vegas. Upon joining LASL, both came to Las Alamos for several days' orientation and training.

All secretaries—as are all LASL employees—are holders of "Q" security clearances, and most technical group and division secretaries are charged with files of classified material—and accountability for them. To secure such material, she is entrusted with combination-locking safes.

If she is assigned to a technical group, scientific jargon becomes her second vocabulary.

Often she is a branch librarian, maintaining records and materials for one of the 32 branch libraries which serve the esoteric disciplines of LASL groups.

Sometimes she is an inventory



B. J. Edwards, J-7 group secretary, works in one of the newest Laboratory buildings—the Weapons Test Support

Facility. In inner office are J. H. Hill, J-7 group leader, left, and Lawrence L. Rice, alternate group leader.

clerk and property custodian for items and services that her department routinely requires and maintains property records on items which are capital equipment and therefore accountable.

Occasionally she is a registrar and receptionist for scientific and administrative meetings and conferences hosted by the Laboratory.

Now and then she is a part-time hostess and guide, as in the community relations group, where ever-increasing numbers of tourists visit the Museum.

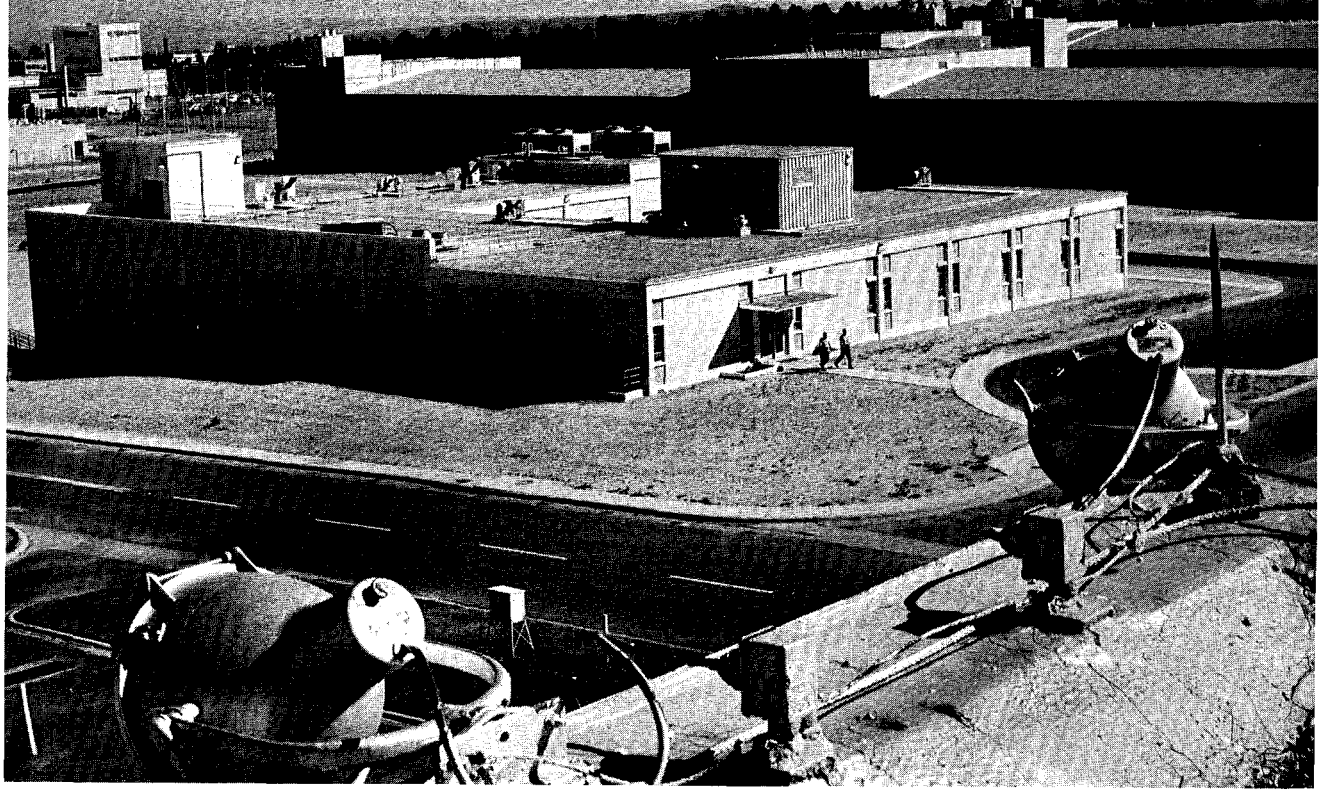
Almost always, she is a coffee maker, message center, general trouble-shooter and a myriad of other things.

As one busy, but never bored, secretary put it, "It's kind of fun."

And a group leader was once heard to say, "I could get along without a staff member for a while, but never without a secretary."

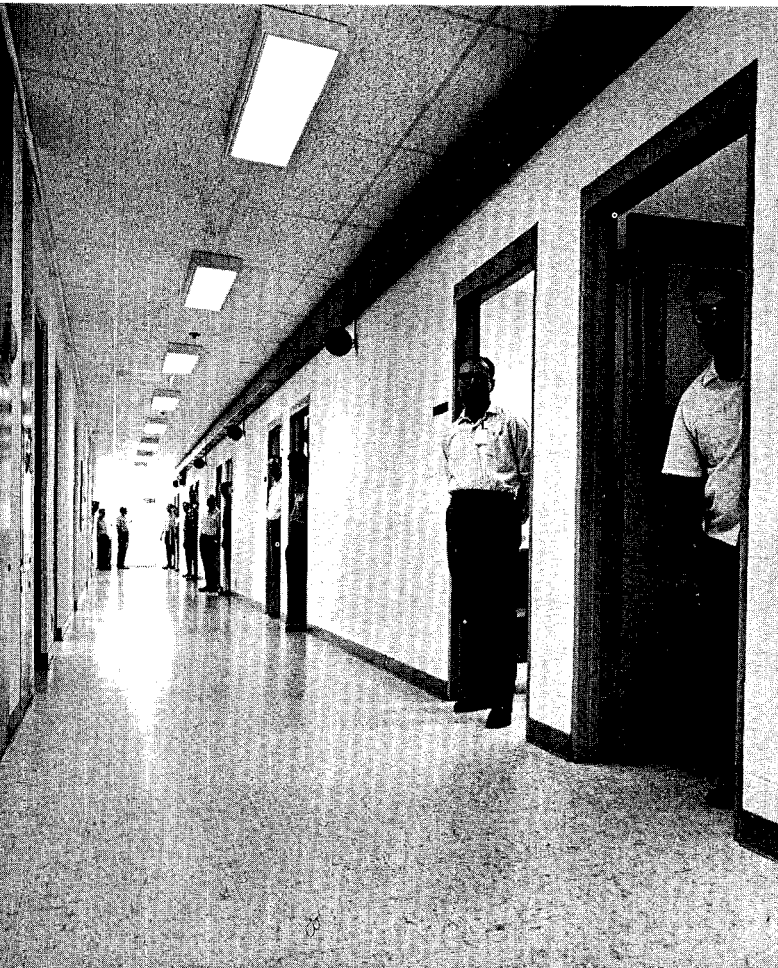


Joan Wooten, group secretary for GMX-6, issues a call for one of her group via the paging system used for the building at Ancho Canyon.

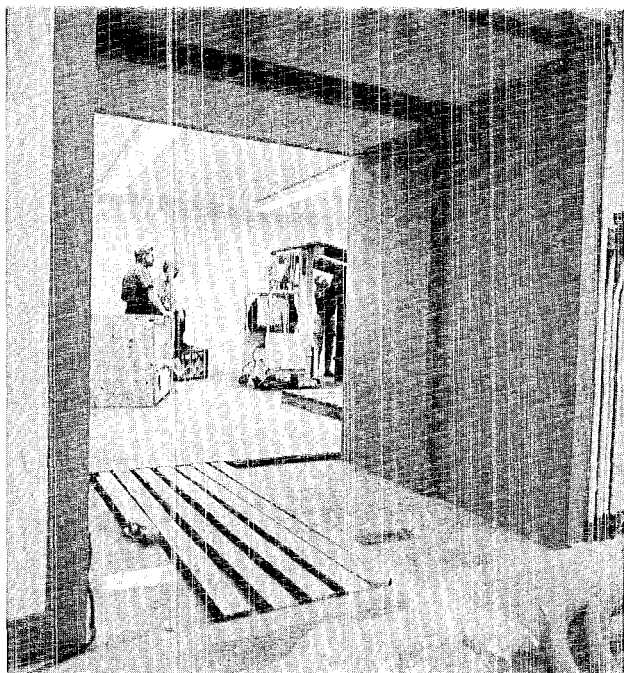


Personnel from three J division groups—J-7, J-14 and J-16 —recently moved into LASL's new Test Support Facility across from D wing of the Administration building.

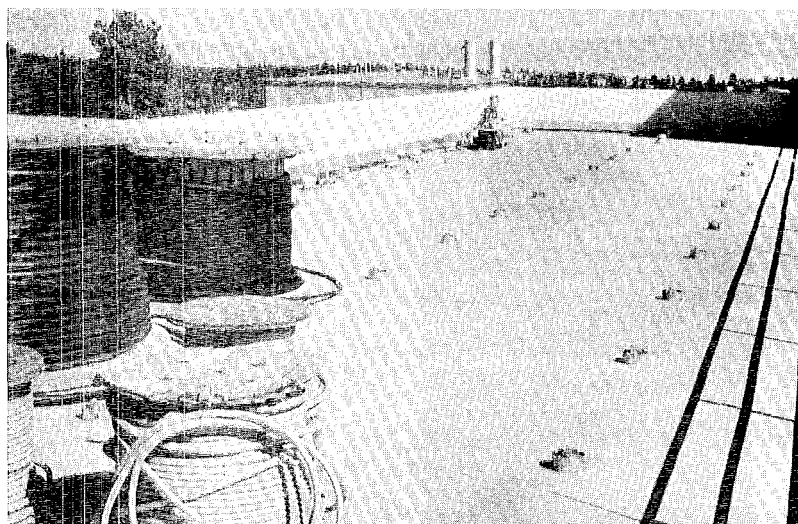
J-7 personnel moved en masse to new building from overcrowded facilities in Administration building basement.



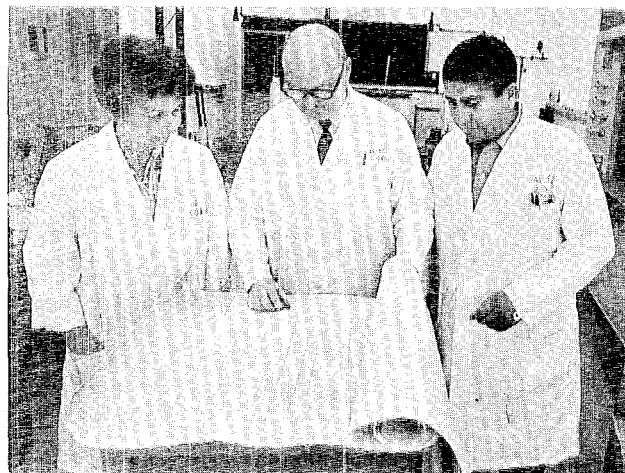
Test Support Facility 'Open for Business'



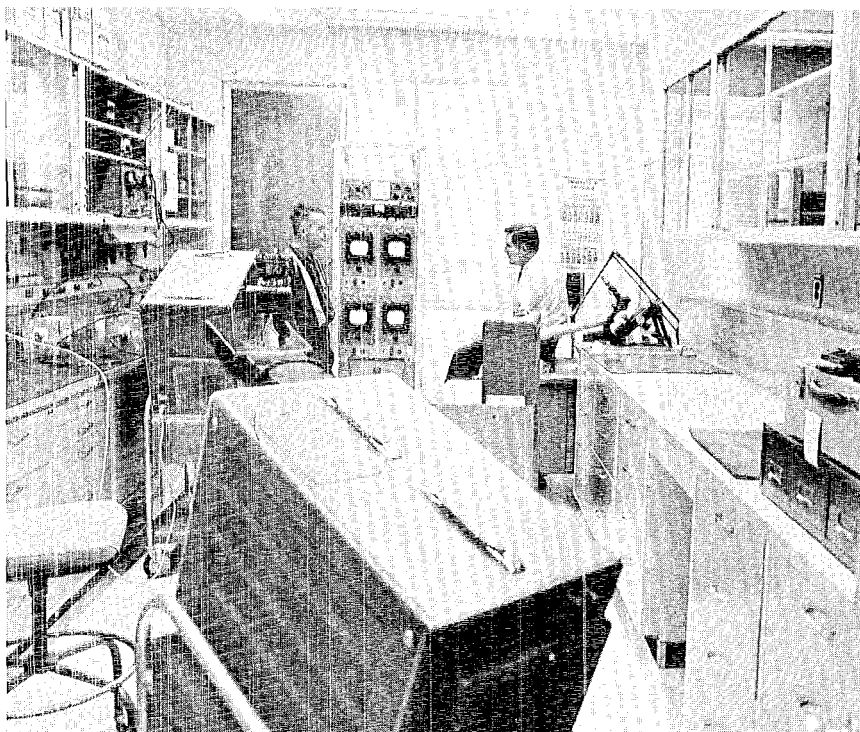
Doug Lier, John Acomb and Eloy Montoya, all J-14, unpack equipment in one of the source rooms. Entire shielding wall closes hydraulically to provide protection to personnel when radioactive sources are in the rooms.




ABOVE: Vern Trexler, J-14 electronics technician, uses an expanse of roof to check out cable used in underground tests. BELOW: Clara Riebe, Earl Fullman and Venacio Martinez, all J-16, moved to new building from Anchor Ranch.



Leo Neher, J-7, and Ed Sullivan, EG&G, Inc., Boston, look over equipment in one of the labs. Oscilloscopes in foreground are among the many types of equipment used to gather valuable data from underground tests.





Classification: Science and the National Interest

By Bill Richmond

THE PROBLEMS BEGAN when the bomb was dropped," says Les Redman, leader of the technical information group, D-6, and chief classification officer at LASL.

"Before that, the burden was on security to protect all the information that would reveal a project in nuclear physics. Every bit of significant information was classified. Well-known physicists were given false names in the attempt to hide the nature of the massive wartime effort on the bomb. Once the basic ideas were out- and the combat drops and the Smyth Report took care of that- there came the difficult decisions on what to tell and what to hide."

Redman has probably been involved with nuclear weapons classification longer than anyone else connected with the AEC. He has been called on several occasions "the man who wrote the book on classification."

"During World War II, everything was classified so there were not many problems," Redman noted. "At LASL, for example, no scientist could buy his own technical reference books because that might betray the nature of the type of research being conducted here. So the University of California library supplied the books, or they were purchased and then shipped from either Los Angeles or Chicago."

Today, Redman, Bob Krohn, alternate group leader, and Cecil Carnes, the third man working in classification, must frequently wrestle with the problems of how to phrase a paragraph in a technical paper so the information necessary to the sense of the paper can be released without revealing any classified information.

The functions of the group, in addition to classification and declassification, include technical editing of reports and journal articles, responsibility for production of technical reports after they are written and technical information management.

Through the years, the emphasis of the group has shifted from a primary concern of protection of classified information to keeping account of what is published by LASL personnel. Originally, when the group received maybe eight technical papers a month, six of them would contain data that were classified. The problem then became one of review for declassification, and these six papers would have to be sent to the AEC declassification branch at Oak Ridge.

Today, the trend has shifted to where the majority of the papers do not contain classified data, and only about one of the 75 papers reviewed here each month must be sent to the declassification branch. This is primarily because of the expansion of the Laboratory programs into fields other than sensitive areas and the liberal change in the declassification rules, Redman said.

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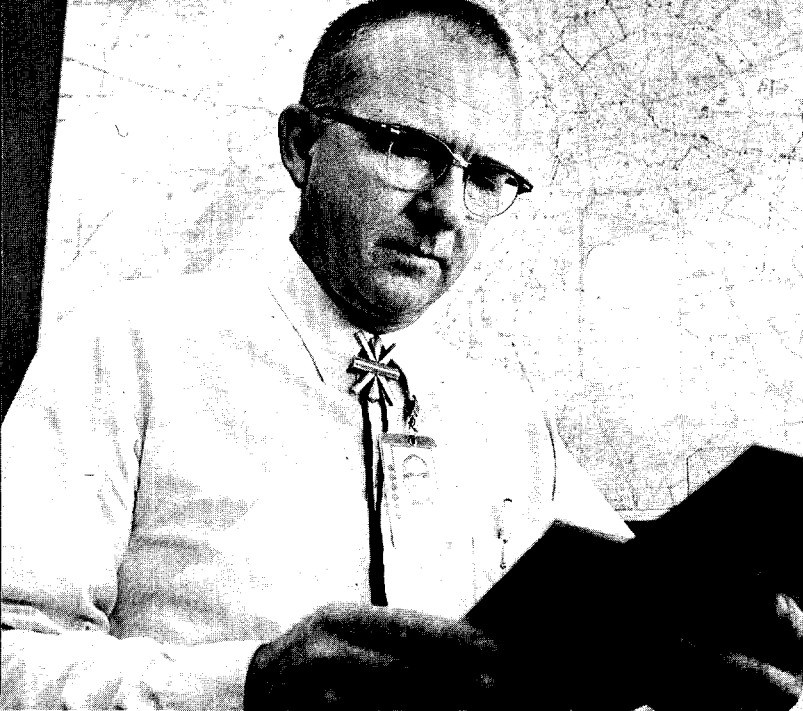
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CLASSIFIED DEFENSE INFORMATION

A multitude of classification stamps are part of the tools of the trade for group D-6.



D-6 Group Leader Les Redman has been called "the man who wrote the book on classification." Behind Les is a map of the city of Berlin marked off into East and West sectors. This map is used to locate addressees to determine from which sector they are writing, as reply requirements to Iron Curtain areas differ from those to other nations.

Classification . . .

continued from preceding page

Within the AEC complex, which includes contractors such as LASL, "classification" and "security" are separate activities. Classification identifies information to be protected, and security provides the protection.

The problems of classification must be handled by persons who understand both technical subjects and classification rules and will make the necessary decisions of "yea" or "nay." As Redman says, "All the good career people in AEC classification are scientists, either by training or experience."

Redman himself worked on the Manhattan Project at the Massachusetts Institute of Technology from April, 1944, until July, 1945. After the war, he completed his requirements for a Ph.D. in chemistry at MIT and then went to Monsanto Chemical for three years as an industrial chemist. He came to LASL in the field of technical information in 1949 and in 1951 became D-6 group leader.

Krohn came to Los Alamos in 1943 as a physicist on the Van de Graaff accelerator. He has a B.S. in electrical engineering in addition to an M.S. in physics and is the electronics expert for D-6, according to Redman.

Carnes also has a physics degree, plus an M.S. in library science, and worked in W-7 for three years and for Dow Chemical as a classification officer for two years. He is particularly informed on plutonium and nuclear components of weapons. And the major classification activities at LASL are weapons or weapons-related work plus the Rover program.

Both Redman and Krohn are also registered patent agents and work with the patents and inventions group (D-1) in reviewing all information released for possible patent problems or interests.

"The role of a classification expert is one of coordination," Redman notes. "He doesn't generate information, but coordinates the national policy with the technical information the scientists and others are generating and using. We are completely dependent on the scientists to tell us what significance the information has and how it relates to existing classified information. We must work very closely with the generators and users of the information."

In regard to declassification, Redman said the five members of the AEC establish guide lines for declassification, and all future regulations flow from activities of the Commission. These guide lines may result from a policy memorandum covering a broad area or by action the Commission takes on a particular item, setting a precedent.

An eight-man board of senior reviewers has been established to advise the Commission on matters pertaining to classification and declassification. LASL is represented on this board by Eugene Eyster, alternate GMX division leader, and to an extent by Frank Hoyt, who is now retired but was once alternate T division leader at LASL.

"There has been steady progress in declassification," Redman said, "as the technical significance decreased or other nations developed in certain scientific or technical areas or demonstrated their ability to do so."



Ann Gregersen and Fidel Garcia keep track of the many classified papers and documents that flow in and out of D-6.

An interesting sidelight is the fact that if classified AEC information appears in the public press it is not automatically declassified. There have been instances, Redman said, when the Commission saw such information in the press but refused to declassify it. "So even if it is in the public domain, the AEC and its contractors must handle that information as classified until it is officially declassified by the Commission," Redman said.

The practice at LASL is that all presentations of the Laboratory's technical work are cleared through D-6 as the coordinating center. Technical papers proposed for inclusion in journals or to be presented at meetings are approved by the division office concerned and then routed to the classification office.

"We review everything that pertains to technical information," Redman said.

As an added precaution, Mail and Records routes some outgoing communications which may contain classified information for review by D-6, plus any foreign correspondence with technical content, and all technical correspondence—both foreign and domestic—from those groups which have requested D-6 to perform this service.

This serves as a double-check that classified technical information is not inadvertently compromised.

"The nature of the classification process involves being aware of all the information that exists regarding nuclear weapons, and the significance of the information to the weapons program—plus the interrelation of all pieces of information," Redman said.

continued on next page



Les Redman, D-6 group leader, confers with his secretary, Ann Gregersen, on the return of a classified document.



Cecil Carnes, left, and Bob Krohn, review scores of technical papers each month that are originated by LASL personnel.

Classification . . .

continued from preceding page

He noted that the weapons program is a particularly sensitive area, much more significant to the security of the nation than the Rover project.

Asked how he viewed the philosophy behind the classification process, Redman answered:

"Classification is a willful interference with the free flow of scientific information for reasons which are hard to state exactly but are related to the national defense and security. Thus, the classification people are practicing scientific immorality. We try, as people trained as scientists, to minimize the extension of this immoral interference with the free flow of information.

"We are necessarily somewhat in opposition to the fundamental objectives of scientists in regard to results of their work. We are also in opposition to the people with central AEC responsibility for security of that information which is vital to national defense and security, because we want to limit restrictions to those both necessary and effective.

"We are really in the middle, unwelcome on either side."

In addition to the technical reports and papers, D-6 is also responsible for reviewing all drawings used by SP for procurement, reviewing and classifying

ing documentary films made by LASL, checking many articles and photographs scheduled for "The ATOM" to be sure they do not contain classified information and working with group and division offices to determine what level of classification to assign a document—Top Secret, Secret or Confidential.

Simply put, D-6 is charged with the responsibility of determining the proper classification—if any—of all technical information originating at LASL.

In regard to the future of classification at LASL, a recent "Immediate Action Directive" from the office of the general manager of the AEC is expected to have a strong influence.

This directive requires, among other things, that all technical papers—relative to the weapons program or the Rover project—must be submitted to AEC classification authorities for review prior to unclassified use at any conference. The directive further states that if the conference is to be held at a "sensitive" installation—such as LASL—then all papers, regardless of subject matter (weapons, Sherwood, accelerators, physics, etc.) must be submitted to AEC classification authorities.

Procedures for these reviews have not yet been published.

short subjects

A change in the managerial control of Carco Air Service, Inc., has been announced by Clark M. Carr. Lloyd Percell, who for the past year has been executive vice president of Carco, has purchased a majority of Carco stock from Carr. Percell now is chairman of the board of directors and president of Carco and of Carco Air Service of Nevada, Inc. Carr will remain with the company as honorary chairman of the board and as assistant to the president. In his announcement Carr said, "I shall gradually become less active in day to day management affairs, but, for a considerable time, will continue to participate and be deeply interested in matters of safety and efficiency." Carco has had an AEC contract to provide air service to and from Los Alamos since 1947.



The National Magnet Laboratory at the Massachusetts Institute of Technology was renamed last month in honor of the late Prof. Francis Bitter, a leading authority on magnetism, MIT faculty member for 33 years and a Los Alamos Scientific Laboratory consultant from 1963 to 1967.

A two-day symposium on physics and magnetic fields was culminated by the ceremony on Nov. 21 when Dr. Howard W. Johnson, MIT president, dedicated the magnet facility as the Francis Bitter National Magnet Laboratory.

Professor Bitter played an important role in the design and construction of the laboratory and conducted a vigorous research program there until his death last July. He had resigned from the MIT faculty in 1960 to devote full time to the planning of the National Magnet Laboratory, which is sponsored at MIT by the Air Force Office of Scientific Research. At LASL, he consulted with GMX-6 on problems relating to megagauss magnetic field research.



Norman G. Wilson, ex-LASL staff member, has been elected to the board of directors of the American Vacuum Society, Inc. Announcement of the appointment came at the society's symposium last month in Kansas City, Mo. Wilson, now on the staff of the University of New Mexico's civil engineering research facility, has been a member of the American Vacuum Society for the past eight years. He served as chairman, New Mexico section, for 1966, and as a member of the vacuum gauge standards committee from 1962 to 1966. Currently, he is a member of the education committee. Wilson is serving as a visiting staff member at LASL while on the UNM staff.

Christmas tree cutting, a part of the multiple use timber management plan for Atomic Energy Commission forest lands in Los Alamos County, will be permitted on seven days this year.

The weekends of Dec. 2 and 3, Dec. 9 and 10, Dec. 16 and 17 and Saturday, Dec. 23, have been declared open for Christmas tree cutting by persons who have obtained permits and New Mexico Forest Department metal tags. Permits are on sale at the Zia Work Order Desk at prices ranging from \$1 to \$3, depending on the size of tree desired. NMFD tags are given out at the same place. Trees must be tagged immediately after being cut.

The county areas open for tree cutting are located west of the West Jemez Road, west and north of the Los Alamos townsite and south of Guaje Canyon and north of State Road 4 (except Guaje Canyon and Los Alamos Canyon).

Tree cutters are warned by AEC Conservation Officer Homer Pickens not to cut any tree within 300 feet of any road or building. All tree cutting areas will be patrolled during the harvest period.

Last year Los Alamos county residents harvested more than 1600 trees.



Dr. Jose Maria Otero de Navascues, right, president of the Junta de Energia Nuclear—Spain's equivalent of the U.S. Atomic Energy Commission—chats with K division leader David Hall during a visit to the Los Alamos Scientific Laboratory last month. Dr. Otero toured the Health Research Laboratory, Project Sherwood, UHTREX and the meson facility.

The Technical Side

Presentation at the Atomic Spectroscopy Symposium, National Bureau of Standards, Washington, D.C., Sept. 11-14:

"Theoretical Calculation of Atomic Energy Levels and Coupling Conditions" by R. D. Cowan, T-DOT

Presentation at the 14th General Assembly of International Union of Geodesy and Geophysics, Zurich, St. Gall, Lucerne and Berne, Switzerland, Sept. 15-Oct. 7:

"Optical Observations of Detailed Auroral Conjugacy at High Latitudes During Magnetically Quiet Times" by A. E. Belon and K. B. Mather, Geophysical Institute, University of Alaska, and N. W. Glass, J-16

Joint Annual Meeting of the New Mexico Academy of Science, Rocky Mountain Section of the American Industrial Hygiene Association, Rio Grande Chapter of the Health Physics Society, Sandia Corporation, Albuquerque, Sept. 29-30:

"Size Selective Air Sampling and Its Importance" by H. F. Schulte, H-5

"Laser Safety Program at LASL" by T. E. Ehrenkranz, H-3, and H. J. Ettinger, H-5

"Testing and Reuse of Respirator Filters" by D. A. Bevis, H-5

Seminar at Arizona State University, Tempe, Ariz., Oct. 6:

"Fluoride Complexes of the Actinides" by L. B. Asprey, CMF-4

High-Energy Physics Seminar, Argonne National Laboratory, Argonne, Ill., Oct. 12:

"Scattering of Mesons by Complex Nuclei" by W. V. Hassenzahl, MP-4

Presentation at American Chemical Society Local Sections at Ridgecrest, Calif.; Las Vegas, Nev.; Fresno, Fullerton and San Diego, Calif., during week of Oct. 16:

"Some Reflections on Ice and Snow" by S. W. Rabideau, CMF-2

Meeting of Chapter 93 of the American Society of Tool and Manufacturing Engineers, Albuquerque, Oct. 19:

"The Nuclear Weapons Incident in Spain" by W. H. Langham, H-4
Seminar at the University of Indiana, Bloomington, Ind., Oct. 19:

"Systematics of Fluoride Coordination in the Actinides" by R. R. Ryan, CMF-4

Two Talks Presented to NRDS/NTS Staff, Nevada Test Site, Oct. 23:

"Research Activities at Los Alamos" by J. H. Manley, Dir. Off.

Presentation at Fourth Annual Meeting of the American Institute of Aeronautics and Astronautics, Anaheim, Calif., Oct. 23-27:

"Radiation Response Criteria for Systems Design and Mission Operations Safety" and "Performance of Trained Monkeys Exposed to Gamma Rays" (Movie) by W. H. Langham, H-4

Seminar at Lawrence Radiation Laboratory, Radiochemistry Division, Livermore, Calif., Oct. 24:

"Radiochemical Research with Nuclear Explosive Neutron Sources" by G. A. Cowan, J-11

Presentation to Electrical Technicians, Sandia Corporation Safety Meeting, Albuquerque, Oct. 25:

"Electrical Safety" by T. E. Ehrenkranz, H-3

Presentation at Brookhaven National Laboratory, Upton, N.Y., Oct. 30:

"Meson-Baryon Scattering and Strongly Coupled Channels" by J. L. Gammel, T-9

Presentation at Meeting of the Savannah River Chapter of the Health Physics Society, Augusta, Ga., Oct. 31:

"The Nuclear Weapons Incident in Spain" by W. H. Langham, H-4

Seminar at Savannah River Laboratory, Aiken, S.C., Oct. 31:

"Radiobiological Factors of Man-ned Space Flight" and "Performance of Trained Monkeys Exposed to Gamma Rays" (Movie) by W. H. Langham, H-4 (Invited talk)

Fourteenth Nuclear Science Symposium, Los Angeles, Calif., Oct. 31-Nov. 2:

"A ^3He Neutron Spectrometer for Time-of-flight Cross Section Measurements Using a Nuclear Explosion Source" by W. K. Brown and A. N. Ellis, both P-3, and D. D. Peterson, Rensselaer Polytechnic Institute

Twentieth Annual Pacific Coast Regional Meeting, American Ceramic Society, San Francisco, Calif., Nov. 1-4:

"Self-Irradiation Damage in Plutonium Ceramics" by C. W. Bjorklund, CMB-11, R. M. Douglass, CMB-1, and J. A. Leary, CMB-11

"Some High-Pressure Effects Within the Uranium Carbon System" by M. C. Krupka, CMB-3

"Crystallography and Magnetic Ordering in Plutonium Carbides by Neutron Diffraction" by J. L. Green, CMB-11, G. P. Arnold, P-2, J. A. Leary, CMB-11, and N. G. Nere-son, P-2

Fifteenth Conference on Remote Systems Technology, American Nuclear Society Meeting, Chicago, Ill., Nov. 5-9:

"Gas-Collection Technique for Measurement of Fission-Gas Retention in Irradiated Mo- UO_2 Cer-mets" by A. J. Patrick, N-5.

"Neutron Response Analysis in Pulsed Coupled-Core Reactors" by G. C. Hopkins, K-1

"A Method for Calculating Self-Shielding Factors for Materials Containing Closely Spaced Particles" by G. L. Ragan, K-1

"Fissioning Neutron Flux Distributions in the Phoebus 1B Facility Shield" by C. W. Watson, N-2

"The Application of High Resolution Neutron Radiography to Industrial Inspection Problems" by D. A. Garrett and R. A. Morris, both GMX-1

"Fission-Product Decay from Fast Fission of ^{239}Pu " by M. E. Battat

new hires

Accounting Department

Thomas R. Kelley, San Antonio, Texas, AO-7

CMB Division

George R. Moore, Fairview, N.M., CMB-AS

Robert N. Strein, Los Alamos, CMB-7

Michael Tokar, Jr., Piscataway, N.J., CMB-11

Frank S. Abeyta, Los Alamos, CMB-14

Gordon R. Brewer, White Sands, N.M., CMB-14

CMF Division

William P. Pratt, Jr., Minneapolis, Minn., CMF-9

D Division

Mario S. Balibarrera, Los Angeles, Calif., D-10

Engineering Department

Gordon D. Crocker, Albuquerque, ENG-3

Richard H. Shaw, Albuquerque, ENG-3

Louise Carson, Los Alamos, ENG-5

Bruce E. Barnaby, San Carlos, Calif., ENG-7

GMX Division

Charles P. Richards, El Vado Lake State Park, N.M., GMX-3

George T. Wright, Albuquerque, GMX-3

Laura M. Dings, Los Alamos, GMX-3

J Division

Celso G. Montoya, Los Alamos, J-12

Jack K. Gentry, Los Alamos, J-12

William R. Tucker, San Diego, Calif., J-17

K Division

Norman E. Wibel, Santa Fe, K-4

Mail and Records

Paul F. Martinez, Los Alamos, M&R (rehire)

MP Division

Thomas A. Lopez, Albuquerque, MP-AE (MP-1)

Donald R. Machen, Geneva, Switzerland, MP-AE (MP-1)

Earl A. Meyer, Madison, Wisc., MP-4

Elgin R. Martin, Salt Lake City, Utah, MP-AE (MP-6)

P Division

Albert Haberstick, Princeton, N.J., P-14

Arthur R. Sherwood, Berkeley, Calif., P-17

Shops Department

George R. Ortiz, Santa Fe, SD-DO

Manuel Olivas, Albuquerque, SD-1

Jerry C. Freer, Albuquerque, SD-1

T Division

Joseph S. Mullins, Albuquerque, T-1

Margaret E. Asprey, Espanola, T-1

Mary A. McFadden, Espanola, T-1

Donald G. Norris, Espanola, T-1

Sharon M. Bremer, Los Alamos, T-1

W Division

Harry H. Luke, Philadelphia, Pa., W-1

the technical side..

and D. J. Dudziak, both K-1, and H. R. Hicks, University of Illinois

American Physical Society Meeting, Division of Plasma Physics, Austin, Texas, Nov. 8-11:

"Properties of Ech Q-Machines" by J. McLeod and H. Dreicer, both P-13

"Perturbation Analysis of Cyclotron Resonance in the Electromagnetic Field of a TE₀₁₁ Mode" by H. Dreicer, P-13

"Use of a Bare Magnetic Plasma Guide Field Coil in Vacuum" by I. Henins and J. Marshall, both P-17

"Plasma Injection and Trapping in the Caulked Stuffed Cusp Experiment" by H. J. Karr, L. C. Burkhardt and J. N. DiMarco, all P-14

"Holographic Diagnostics: Interferometry; Moire-Schlieren" by E. C. Jahoda, P-15

"Turbulent Dissipation of Pressure Anisotropy in High Beta Plasmas" by D. O. Dickman, T-1, and R. L. Morse, P-18

"Transient Polarization Calculations of a Plasma Stream in a Transverse Magnetic Field" by D.

A. Baker, P-18, and L. W. Mann, T-5

"Confinement of Energetic Plasma in the Caulked Stuffed Cusp Experiment" by J. N. DiMarco, L. C. Burkhardt and H. J. Karr, all P-14

"Experiment on Plasma Stream Interactions Through Polarization Electric Fields" by J. E. Hammel, P-17, and R. W. Kewish, P-16

"Computation of Q-Machine End Plate Profiles" by D. B. Henderson and H. Dreicer, both P-13

"Looking Toward a Pulsed High Beta Thermonuclear Reactor" by J. L. Tuck, P-DO (Invited talk)

Colloquia at Physics Department, Kansas State University, Manhattan, Kans., Oct. 17; Physics Department, Carnegie Mellon University, Pittsburgh, Pa., Oct. 20; Physics Department, University of Massachusetts, Amherst, Mass., Oct. 26; Physics Department, University of Maryland, College Park, Md., Oct. 30; Physics Department, University of Minnesota, Minneapolis, Minn., Nov. 8; and Physics Department, University of Illinois, Urbana, Ill., Nov. 9:

"The Shell-Model Description of Nuclei in the Region of ²⁰⁸Pb" by P. D. Barnes, P-DOR

Seventh Annual Meeting of the American Society for Cell Biology, Denver, Colo., Nov. 13-15:

"Properties of Mammalian Mitochondria in vivo and in vitro" by J. M. Machinist and C. T. Gregg, both H-4

Presentation at 651st Meeting of the American Mathematical Society, Albuquerque, Nov. 18:

"An Interesting Imbedding for a Class of Volterra Operators" by G. H. Pimbley, T-8

Twentieth Anniversary Meeting of the Division of Fluid Dynamics, American Physical Society, Bethlehem, Pa., Nov. 20-22:

"The Effect of Oxygen Atoms on the Vibrational Relaxation of Nitrogen" by P. F. Bird and W. D. Breshears, both GMX-7

American Institute of Chemical Engineers, Annual Meeting, New York, N.Y., Nov. 26-30:

"Los Alamos Studies of Heat Transfer to Cryogenic Fluids" by K. D. Williamson, Jr., J. R. Bartlit and R. S. Thurston, all CMF-9

Seminar at Pennsylvania State University, University Park, Pa., Dec. 1:

"Nuclear Rocket Program and Associated Cryogenic Problems" by K. D. Williamson, Jr., CMF-9

20

years ago in los alamos

Culled from the files of Los Alamos Times, December, 1947, by Robert Y. Porton

Feline Visitation

That there is a large cat population roaming within Los Alamos boundaries was definitely shown this week when many bobcat and mountain lion tracks were found by various persons following the early snow. The Sportsman's Club conservation committee has suggested a hunt as a major start to eradicate these predators here on the Project.

New Group Shows Film Classic

A French film, "The Baker's Wife", the first production of the newly formed Los Alamos Film Society, will be shown Thursday evening in the high school auditorium. The society, a non-profit organization, has been formed to fill a need for outstanding foreign and American films unavailable in the usual commercial motion picture theater. Charter committee members include Carson Mark, Mr. and Mrs. Foster Evans, Mr. and Mrs. Bergen Suydam, Mr. and Mrs. David Hall, Bengt Carlson and Eugene Robinson.

U.S. Cites Bradbury for A-Bomb Service

Formal government acknowledgement of the part he played in the development of the atomic bomb has been accorded Dr. Norris E. Bradbury, director of the Los Alamos Laboratory, by the award of the Legion of Merit. The citation was presented by James Forrestal, Secretary of Defense.

Food Prices

From the Dec. 5, 1947, issue of the **Times**, when the paper first opened its pages to commercial advertising: celery, pound, 33 cents; cranberries, pound, 49 cents; pineapple juice, 46-ounce can, 47 cents; fryers, pound, 85 cents; eggs, dozen, 83 cents (Editor's note: Good old days?)

State Bans Selling Full-Strength Beer in Clubs

Wholesale liquor distributors have received orders from the State Liquor Control Division to cease selling beer to Los Alamos clubs with the exception of 3.2% beer, commonly referred to as "Military Brew." The ban, according to newspaper reports, is to apply to all army installations in the state. Liquor Director Tom O. Montoya could not be reached for comment or interpretation of this aspect of the order which would lump Los Alamos, a civilian installation, in the military category as far as the State Liquor Division is concerned.

what's doing

LOS ALAMOS CONCERT ASSOCIATION: Thursday, Dec. 14—Ann Schien, pianist, 8:15 p.m., Civic Auditorium.

LOS ALAMOS CHORAL SOCIETY (with Sinfonietta), Epiphany Concert, Friday, Jan. 12, 8:15 p.m., First Methodist Church, Los Alamos. To be repeated Sunday, Jan. 14, 4 p.m., St. Francis Cathedral, Santa Fe. Included will be Bach Cantata No. 65 for the Epiphany and Magnificat by Vaughan-Williams. Tickets, which must be purchased in advance, available at Gifts-World Imports; Hayes Jewelers and Decols in Los Alamos, or call Meredith Matlack. \$1.50 for adults; 75 cents for students.

LIGHT OPERA: Lerner and Lowe's "On a Clear Day You Can See Forever," Dec. 8 and 9, Civic Auditorium, 8:30 p.m. All seats reserved. Ticket mail orders: Los Alamos Light Opera, P.O. Box 352; also available evenings, 7 p.m. to 9 p.m. at auditorium box office. Prices \$3, \$2.50, \$2 and \$1.50.

LOS ALAMOS ARTS AND CRAFTS ASSOCIATION:

Exhibit, LASL Personnel Building, now through Dec. 31, representational show of all members of association.

TRAVEL SLIDE PROGRAM: Mesa Public Library, 7:30 p.m.

Thursday, Jan. 4—"Central Europe" by Dale Holm

FILM SOCIETY: Civic Auditorium, admission by single ticket, 90 cents, or season ticket, \$4.

Wednesday, Dec. 20, 7 and 9 p.m., "How Not to Rob a Department Store."

SKI AND SKATE SALE: Sponsored by Los Alamos Ski Club and Los Alamos Skating Club. Wednesday, Dec. 13, 7 p.m. to 9 p.m., Recreation Hall, Rooms 1 and 2. Each item should be marked with owner's name, description of item and price desired.

OUTDOOR ASSOCIATION: No charge; open to the public. Contact leader for information about specific hikes.

Thursday, Dec. 7, Meeting at home of Betty Hansbury, 16 San Juan, 8 p.m.

Sunday, Dec. 10, Pajarito Mountain (Skis, snowshoes or hike). Ken Ewing, leader, 8-4488.

Saturday, Jan. 6, Lake Peak. Ken Ewing, leader, 8-4488.

MESA PUBLIC LIBRARY EXHIBITS:

Art Exhibits:

Dec. 9 to Jan. 5—Oils and pastels by Tommy Macaione, Santa Fe.

Case Exhibit:

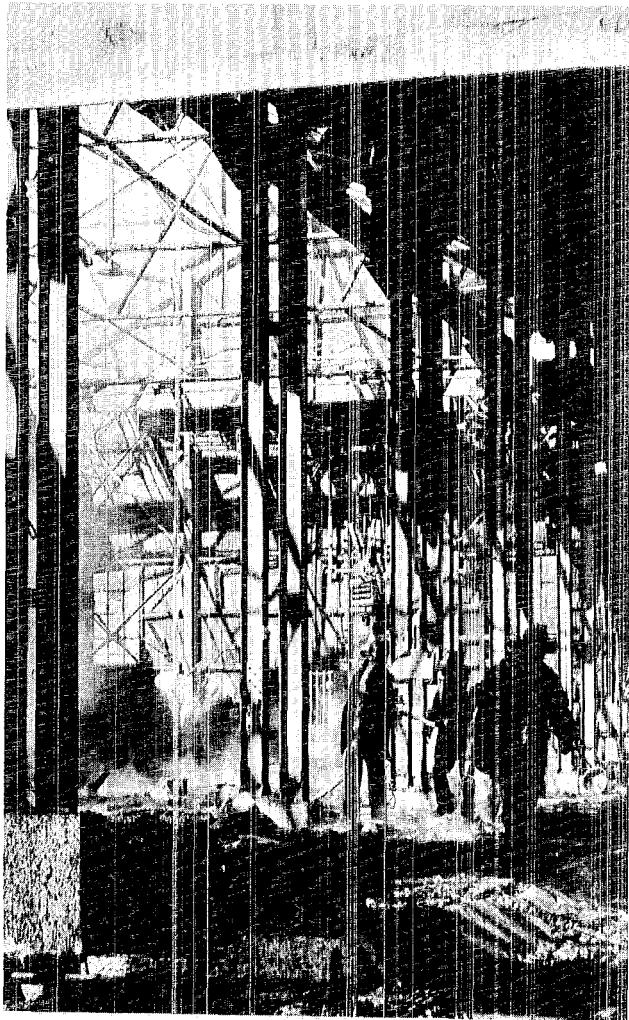
Christmas Cookie Tree Exhibit by Louise Cornell and Alice Wynne.

PUBLIC SWIMMING: Los Alamos High School pool. Adults, 50 cents; students, 25 cents.

Monday through Thursday, 7:30 to 9:30 p.m.

Saturday and Sunday, 1 to 6 p.m.

Sunday, 7 to 9 p.m. Adults only.



There was plenty of work for Los Alamos firemen when the old diesel plant on Trinity Drive caught fire last month while workmen were tearing it down. Loss was very little, since all equipment had already been removed in preparation for its dismantling. Photo at left is by Craig Olsen, son of Hal Olsen, D-3; photo above by Marshall Smith, editor of The Zia News.

BACK COVER:

Dasher? Dancer? Vixen? They may be mule deer instead of reindeer, but Los Alamos has plenty of deer to supply Santa with a team this Christmas.

Henry T. Motz
3137 Woodland
Los Alamos, New Mexico

87544

